REMARKS

Claims 14-40, 54-57 and 71-94 are pending in this application, claims 14-40 and 54-57 having been rejected. Claims 14, 23, 34 and 54 have been amended. Claims 14, 23, 34 and 54 are independent.

It is noted that pending claims 71-94 were not specifically rejected or even discussed in the Office Action (these claims were previously presented in the Amendment filed on April 21, 2002). Accordingly, given the absence of a specific rejection of claims 71-94, it is understood that claims 71-94 were deemed to present allowable subject matter. If, however, the Examiner deems otherwise, the Examiner is respectfully requested to state with specificity why those claims are unpatentable.

The Rejection
Under 35 U.S.C. § 103

Claims 14-40 and 54-47 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,668,362 to Plesko in view of Japanese Patent Abstract 57-108237 to Tadashi. Applicants respectfully traverse this rejection and submit the following arguments in support thereof.

Before addressing the merits of this rejection, Applicants wish to point out that although the Office Action refers to Japanese Patent Abstract 57-108237 to Tadashi, the first named inventor for JP 57-108237 is Sato. Nevertheless, for consistency, this response will use Tadashi when referring to JP 57-108237.

Considering the merits of this rejection, it will be appreciated that the invention, as recited in claim 14, concerns a spring for driving a precision machine. The spring can be

mounted on a substrate receiving at least a portion of the spring, and the spring is formed of spirally arranged amorphous metal having an S-shaped free exploded shape lying in a plane so that when the spring is mounted on the substrate the spring has an initial flexure imparted thereto. The spring serves as an energy storage device.

Further, Applicant's invention, as set out in claim 23, involves a mainspring for driving a precision machine. The mainspring can be mounted on a substrate receiving at least a portion of the mainspring, and the mainspring is formed of spirally arranged amorphous metal having an S-shaped free exploded shape lying in a plane so that when the mainspring is mounted on the substrate the mainspring has an initial flexure imparted thereto.

The invention, as recited in claim 34, also pertains to a hairspring for driving a precision machine. The hairspring can be mounted on a substrate receiving at least a portion of the hairspring, and the hairspring is formed of spirally arranged amorphous metal having an S-shaped free exploded shape lying in a plane so that when the hair is mounted on the substrate the spring has an initial flexure imparted thereto.

Applicant also have invented, as recited in claim 54, a mainspring for driving a precision machine. The mainspring can be mounted on a substrate receiving at least a portion of the mainspring, and the mainspring has plural spirally arranged laminated amorphous metal sheets, together having an S-shaped free exploded shape lying in a plane so that when the mainspring is mounted on the substrate the mainspring has an initial flexure imparted thereto.

Thus, it will be appreciated that the present invention involves a spirally-arranged amorphous metal spring, having an S-shaped free exploded shape, such that, when the spring is mounted, the spring has an initial flexure, for driving a precision machine.

The claimed invention enables the long-time operation of a precision machine, which also enhances the precision of the machine and stabilizes its operation. This is achieved through careful selection of both the material from which the spring is made and the shape of the spring as produced. By using an amorphous metal spring formed into an S-shaped free exploded shape, as Applicants have, it is possible to improve the volume density of accumulating energy in the spring.

Applicants respectfully submit that none of the cited references, whether taken alone or in combination, suggest all the aspects of the present invention.

Initially, Applicants respectfully traverse this rejection on the grounds the cited references are not properly combined. In this regard, it should be understood that an object of the invention, as recited for example in claim 14, is different from the object of the cited references. An object of the invention of this application is to realize long-time operation by providing a spring for driving, which enhances precision of a machine and keeps a stabilized operation. However, neither Plesko nor Tadashi discloses such an object. Rather, Tadashi, for example, is meant to reduce the formation of rust and the occurrence of breakage.

In addition, the composition of the invention is different from the composition of the cited references. Neither Plesko nor Tadashi discloses a spirally arranged amorphous metal having an S-shaped free exploded shape.

Although the Office Action contends at page 3 that selecting the size and shape of the spring, absent criticality, is an obvious modification of the size and shape of Plesko's spring, that argument is not well-taken, since it fails to recognize this application **contains evidence that the claimed spring shape is important.** See, for example, the disclosure at pages 13-16 of the specification, and Fig. 4, which teach why the shape of the spring is important.

Since the Office Action admits at page 2 that Plesko does not teach a spring shaped as claimed and Tadashi does not teach such a spring either, and since Applicants have shown this shape is of importance, the grounds supporting this rejection are not well-taken.

Additionally, the effect of the invention differs from the effect of the teachings of the two cited references. Neither Plesko nor Tadashi suggests anything about an effect of improving the volume density of accumulating energy in the spring synergistically, by carefully selection of the material of the spring and the shape of the spring. In addition to this effect, since Applicants use amorphous metal as the spring material, Applicants are able to achieve the object described in Tadashi of reducing rust formation and breakage. Accordingly, since the present invention has as one of its effects the improvement in volume density of accumulating energy in the spring synergistically, which is different from and not suggested by the above-mentioned effects described in Plesko or Tadashi, Applicants assert that the invention, as claimed, is not suggested by the cited art.

Applicants respectfully traverse the asserted combination of Plesko with Tadashi because that combination would result in a structure that renders Plesko unfit for its intended purpose. In this regard, it should be noted that M.P.E.P. § 2143.01 reads in pertinent part:

> THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE
>
> If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)

That is precisely the situation here - to modify Plesko to use a spring shaped as claimed would render Plesko unfit for its purpose. , Plesko teaches the use of a helical spring that helps to

reduce vibrations in a light beam scanning element. As described at column 4, line 54 to column 5, line 11 of Plesko, the helical spring 200 is coupled to a rotor shaft that oscillates about a longitudinal axis through an angle of less than 360°, preferably from 5° to 7°. Thus, as shown in Fig. 2 by the double headed arrow labeled "A", the rotor rotates back and forth about its axis. The spring described in Plesko merely reduces any vibrations or jerky motions potentially imparted to the rotor shaft by the sudden reversal in its direction of travel at its end positions; it tolerates and helps damp sudden motion (see Plesko at column 9, lines 3-7). Since the rotor rotates in two directions, the spring would reduce vibrations when the rotor spins in those directions. Accordingly one skilled in the art would understand Plesko's spring is not a driving spring. It merely accommodates oscillation in a rotor shaft.

Moreover, it is not possible to modify Plesko to a spring shaped as claimed. Using a spring that has an S-shaped free exploded shape is not possible because, were such a spring mounted, that spring would have an initial flexure that would cause the spring to bias the rotor in one direction and so interfere with the operation of the light scanner. Accordingly, one skilled in the art would understand that the spring described in Plesko does not have an S-shaped free exploded shape, such that, when the spring is mounted, the spring has an initial flexure, as is claimed, and they would not be led to use such a spring because it would render the Plesko device unfit for its intended purpose of damping oscillations.

Turning to Tadashi, that reference does not remedy the above-noted deficiencies of Plesko with regard to the claimed invention. Tadashi merely teaches the use of a spring made from an amorphous metal. However, Tadashi does so just to reduce the formation of rust and the occurrence of breakage. Tadashi does not teach or suggest a spring having an S-shaped free exploded shape, such that, when the spring is mounted, the spring has an initial flexure. Tadashi

therefore suffers from the same defects as Plesko, and so the combination of Plesko and Tadashi in no way suggests the invention as recited in claim 14.

Even if the references are combined, the resulting structure still would not have all the features of the present invention.

As admitted by the Examiner, Plesko does not teach a spring made of an amorphous metal, or having the claimed configuration - as discussed earlier, the spring described in Plesko does not have an S-shaped free exploded shape, such that, when the spring is mounted, the spring has an initial flexure. Further, Tadashi just uses amorphous metal to reduce the formation of rust and the occurrence of breakage, but does not describe that spring as having the S-shaped free exploded shape (which, as noted earlier, has an effect of improving the volume density of accumulating energy in the spring synergistically). Therefore, the cited references, whether taken alone or in combination, do not teach or suggest the spring as recited in the claims.

The remaining rejected claims, claims 15-22, 24-33, 35-40, 55-57, and 71-94, all ultimately depend from and so incorporate by reference all the features of independent claims 14, 23, 34 and 54. Accordingly, these claims patentably distinguish over the cited art at least for the same reasons as their respective base claims, which reasons are incorporated by reference herein.

For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection is respectfully requested.

CONCLUSION

Applicants respectfully submit that all outstanding rejections have been addressed and are now either overcome or moot. Applicants further submit that all claims pending in this

application are patentable over the prior art. Favorable reconsideration and withdrawal of those rejections and objections is respectfully requested.

In view of the foregoing revisions and remarks, Applicants respectfully request entry of this amendment and submit that entry of this amendment will place the present application in condition for allowance.

The Commissioner is authorized to charge any fees now or hereafter due in connection with the prosecution of this application to Deposit Account No. 19-4709.

In the event that there are any questions, or should additional information be required, please contact Applicants' attorney at the number listed below.

Respectfully submitted,

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